

Urban Road Network Extraction From Very High Resolution RGB Aerial Images And DSM Data

Darlis Herumurti¹, Keiichi Uchimura¹, Gou Koutaki¹, Takumi Uemura²

¹*Kumamoto University*

2-39-1, Kurokami, Kumamoto, 860-8555, Japan

darlis@navi.cs.kumamoto-u.ac.jp

²*Sojo University*

4-22-1, Ikeda, Kumamoto, 860-0082, Japan

Abstract: In this paper, we address the problem of automatic road network extraction in urban areas from high resolution RGB aerial imagery and the Digital Surface Model (DSM) data. In urban areas, the road is dominant and surrounds the buildings. However, the building's shadows and the trees along streets are the main problem for road extraction in an aerial image. In order to overcome these problems, we use DSM data, which is based on the elevation of land surfaces. In addition, we use an extremely high-resolution image in which the road signature, such as cars, road lines, zebra crossings and the like, can be seen in detail. In this work, we first establish the location of the zebra crossing in an aerial image, because it is easy to recognise these patterns. The location of these zebra crossing represents the starting point and we can obtain the elevation from the corresponding DSM data. In the DSM data, the elevation of the road and the building is differ significantly; therefore, we expand the starting point based on a local thresholding and improve it using a seeded region growing, to create the initial road region quickly. A road line filter based on Radon transform and morphological operations are then carried out to remove the false road and produce the road line. Furthermore, we employ a road tracker to construct the road network using B-spline based on road line segment clustering. The experimental road network extraction from Shinjuku and Sapporo, which are urban areas in Japan, shows that the proposed method is run quick enough to be used to track the road using high resolution data with good accuracy.

Keywords: road extraction, high resolution, radon transform, morphological operations.